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High Frequency Ultrasound Arrays for Intracardiac Imaging

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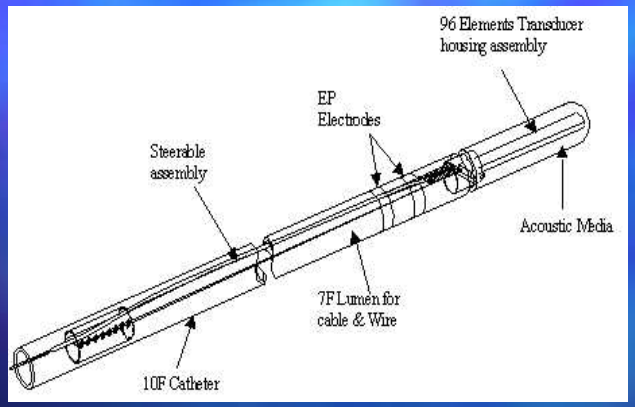
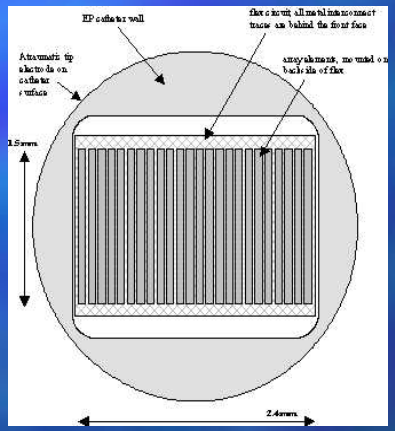
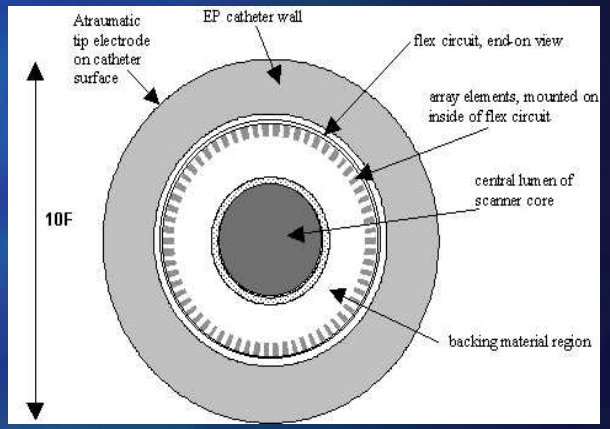






Specific Aim 1

Test hypothesis that intracardiac echocardiography (ICE) can critically guide electrophysiological procedures (EP) for the heart; to improve EP outcomes while simultaneously reducing procedure duration, radiation exposure, and cost.

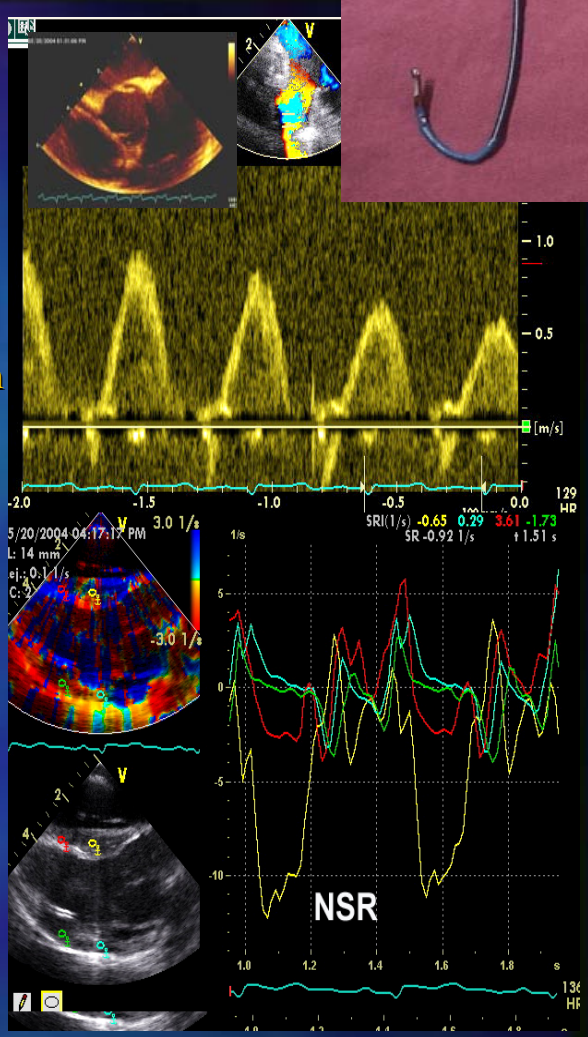
Specific Aim 2

Test hypothesis that ultrasound based strain rate imaging with a high resolution intracardiac array can guide EP electrode placement and assess the efficacy of therapeutic cardiac procedures using studies in animal models and human patients.

Progress

Science:

- Our first hockey-stick 64-element side-looking phased array ICP enabled catheters have been completed.
  - They have undergone animal testing for imaging and tissue Doppler strain rate methods for tracking the propagation of arrhythmias.
  - Further testing this summer will image ablation from an intracardiac location and finish the investigational device exemption for this device.
- The second device, a forward-looking microlinear array, will have either a 32-element piezoelectric or potentially a C-MUT array.
  - The C-MUT design could potentially be implemented with miniature pulses and multiplexing and could be adapted to deliver high intensity ultrasound so that not only RF ablations but also high-frequency ultrasound ablation could be performed.
- The third device will be a 9 French C-MUT based imaging system in a ring array with an outside ablation electrode on the side wall. The aperture will admit a 7 French steerable catheter, the action of which can be imaged in 3D space from the outer catheter.



Administrative issues:

- Our partnership is cordial, professional and enthusiastic. All segments are operating smoothly.
- The loss of JOMED as a partner moved Doug Stephens into a central role as engineering coordinator now working in the Biomedical Engineering Department of UC Davis, in Katherine Ferrara's lab.
- The technology which was to have been available through JOMED was switched towards a much more interesting and advanced set of technologies – that is the tremendous expertise of Prof. Pierre Khuri-Yakub, which should yield us versatile new types of arrays with facilitated multiplexing types of connections